

Claims

1. A laminated sintered body having a ceramic porous body having a thickness of $300\text{ }\mu\text{m}$ or larger and a ceramic dense body having a thickness of $25\text{ }\mu\text{m}$ or smaller, said laminated sintered body having a helium leakage rate of $10^{-6}\text{ Pa}\cdot\text{m}^3/\text{s}$ or lower.
2. The laminated sintered body of claim 1, having an area of 60 cm^2 or larger.
3. The laminated sintered body of claim 1, obtained by laminating green bodies for said porous body and said dense body to obtain a laminate, pressure molding said laminate by cold isostatic pressing to obtain a pressure molded body, and sintering said pressure molded body.
4. The laminated sintered body of claim 1, for use in an electrochemical cell.
5. The laminated sintered body of claim 4, wherein said dense body is a solid electrolyte film, and said porous body is at least one of an anode and a cathode.
6. The laminated sintered body of claim 4, wherein said laminated sintered body is a conductive interconnector for electrically connecting a plurality of said electrochemical cells, said porous body is a ceramic substrate and said dense body is a ceramic film provided on said ceramic substrate.
7. An electrochemical cell comprising said laminated sintered body of claim 1.
8. The electrochemical cell of claim 7, wherein said dense body is a solid electrolyte film and said porous body is at least one of an anode and a cathode.
9. A method of producing a laminated body having a ceramic porous body having a thickness of $300\text{ }\mu\text{m}$ or larger and a ceramic dense body having

a thickness of 25 μm or smaller; said method comprising the steps of:

laminating green bodies for said porous body and said dense body to obtain a laminate,

subjecting said laminate to pressure molding by cold isostatic pressing to obtain a pressure molded body, and

sintering said pressure molded body to obtain a laminated sintered body.

10. The method of claim 9, further comprising the step of laminating a resin sheet to said green body for said dense body before said laminate is subjected to pressure molding by cold isostatic pressing.

11. The method of claim 10, further comprising the step of removing said resin sheet from said pressure molded body before said pressure molded body is sintered.

12. The method of claim 9, wherein said laminate is pressure molded by cold isostatic pressing without providing a joining agent between said green bodies for porous and dense bodies.

13. The method of claim 9, wherein said laminate comprises one said green body for said porous body and a plurality of said green bodies for said dense bodies and subjected to pressure molding by cold isostatic pressing.

14. The method of claim 9, wherein said pressure molding is carried out applying a dry rubber press method or wet rubber press method.

15. The method of claim 9, wherein said ceramic laminated sintered body is in use for an electrochemical cell.

16. A ceramic laminated sintered body obtained by the method of claim 9.

17. The laminated sintered body of claim 16, having a helium leakage rate of $10^{-6} \text{ Pa} \cdot \text{m}^3/\text{s}$ or lower.

18. An electrochemical cell comprising said ceramic laminated sintered body of claim 16, wherein said dense body is a solid electrolyte film and said porous body is at least one of an anode and a cathode.

19. A conductive interconnector for connecting a plurality of electrochemical cells, said cell having a first electrode contacting first gas, a second electrode contacting a second gas, and a solid electrolyte film provided between said first and second electrodes: said conductive interconnector comprising:

a ceramic substrate made of a material having resistance against said first gas at an operational temperature of said electrochemical cell, and

a ceramic film formed on said substrate and made of a material having resistance against said second gas at an operational temperature of said cell.

20. The interconnector of claim 19, wherein said first gas is an oxidizing gas and said second gas is a reducing gas.

21. The interconnector of claim 19, wherein said ceramic substrate comprises lanthanum manganite and said ceramic film comprises lanthanum chromite.

22. The interconnector of claim 19, wherein said ceramic substrate comprises nickel-zirconia cermet and said ceramic film comprises lanthanum chromite.

23. The interconnector of claim 19, comprising a conductive film on said ceramic film.

24. The interconnector of claim 19, wherein said ceramic substrate comprises a groove formed therein for flowing said first gas.

25. The interconnector of claim 19, wherein said ceramic substrate comprises a ceramic porous body having a thickness of 300 μm or larger and

said ceramic film comprises a ceramic dense body having a thickness of 25 μm or smaller, and wherein said interconnector comprises a laminated sintered body of said ceramic porous body and said ceramic dense body, and said interconnector having a helium leakage rate of $10^{-6} \text{ Pa} \cdot \text{m}^3/\text{s}$ or lower.

26. An electrochemical device comprising a plurality of electrochemical cells and a conductive interconnector for connecting said cells, said cell having a first electrode contacting a first gas, a second electrode contacting a second gas, and a solid electrolyte film provided between said first and second electrodes; said conductive interconnector comprising:

a ceramic substrate made of a material having resistance against said first gas at an operational temperature of said electrochemical cell, and

a ceramic film formed on said substrate and made of a material having resistance against said second gas at an operational temperature of said cell.

27. The device of claim 26, wherein said first gas is an oxidizing gas and said second gas is a reducing gas.

28. The device of claim 26, wherein said ceramic substrate comprises lanthanum manganite and said ceramic film comprises lanthanum chromite.

29. The device of claim 26, wherein said ceramic substrate comprises nickel-zirconia cermet and said ceramic film comprises lanthanum chromite.

30. The device of claim 26, comprising a conductive film on said ceramic film.

31. The interconnector of claim 26, wherein said ceramic substrate comprises a groove formed therein for flowing said first gas.

32. The device of claim 26, wherein said ceramic substrate

comprises a ceramic porous body having a thickness of 300 μm or larger and said ceramic film comprises a ceramic dense body having a thickness of 25 μm or smaller, and wherein said interconnector comprises a laminated sintered body of said ceramic porous body and said ceramic dense body, and said interconnector having a helium leakage rate of $10^{-6} \text{ Pa} \cdot \text{m}^3/\text{s}$ or lower.